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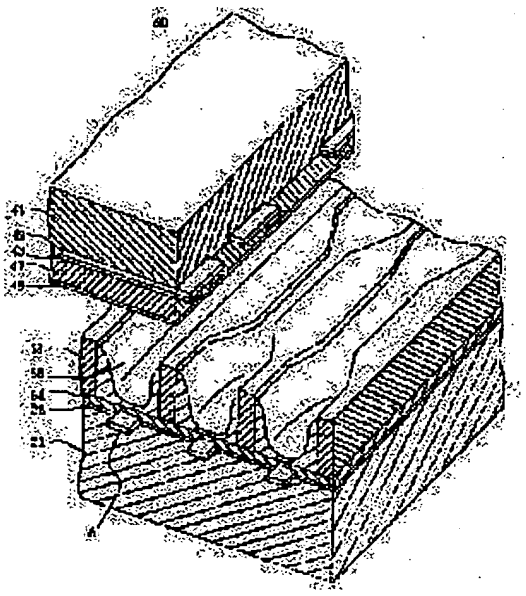
(54) PLASMA DISPLAY PANEL

(57)Abstract:

PROBLEM TO BE SOLVED: To increase emission luminance, and keep and vary color balance by increasing the luminescent area of a specific color phosphor in a plasma display panel for color display.

SOLUTION: This plasma display panel 40 has multiple discharge electrode couples arranged in parallel with one another and multiple barrier ribs 59 arranged in a direction intersecting with the multiple discharge electrode couples, and three kinds of phosphors 58 corresponding to luminescent colors different from one another are sequentially arranged in discharge spaces each interposed by adjacent barrier ribs. In this case, the side edge shape of each of the barrier ribs 59 is so regularly formed in a laterally asymmetrical form as to set the barrier rib intervals of non-discharge cell parts smaller than those of discharge cell parts corresponding to the discharge electrode couples in the discharge spaces wherein the phosphors having low luminescent color luminance out of the phosphors 58 are arranged, so that the luminescent surface in the peripheral part of each of the discharge cells of the low luminance phosphors is widened.



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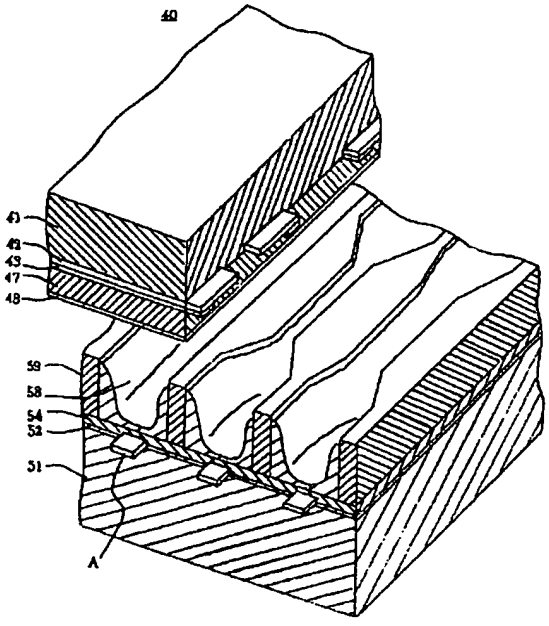
(54)【発明の名称】　プラズマディスプレイパネル

(57)【要約】
【課題】　カラー表示用のプラズマディスプレイパネルに関し、特定の色の蛍光体の発光面積を増やすことで発光輝度を上げ、色バランスを保ったり変化させたりすることを可能にする。
【解決手段】　互いに平行に配置された複数の放電電極対と、前記放電電極対に交叉する方向に配置されている複数の隔壁とを有し、隣接する隔壁に挟まれた放電空間に、順次異なる発光色に対応した３種類の蛍光体を配置したプラズマディスプレイパネルであって、前記蛍光体のうち、発光色の輝度が低い蛍光体が配置されている放電空間において、前記放電電極対に対応した放電セル部の隔壁間隔よりも非放電セル部の隔壁間隔が狭くなるように、各隔壁の側縁形状を規則的に左右非対称に形成し、当該低輝度蛍光体の放電セル周辺部における発光面を広くする。

本発明に係わるＰＤＰの要部の分解斜視図



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【特許請求の範囲】

【請求項１】　互いに平行に配置された複数の放電電極対と、

前記放電電極対に交叉する方向に配置されている複数の隔壁とを有し、

隣接する隔壁に挟まれた放電空間に、順次異なる発光色に対応した３種類の蛍光体を配置したプラズマディスプレイパネルであって、

前記蛍光体のうち、発光色の輝度が低い蛍光体が配置されている放電空間において、前記放電電極対に対応した放電セル部の隔壁間隔よりも非放電セル部の隔壁間隔が狭くなるように、各隔壁の側縁形状を規則的に左右非対称に形成し、当該低輝度蛍光体の放電セル周辺部における発光面を広くしたことを特徴とするプラズマディスプレイパネル。

【請求項２】　前記発光色の輝度の低い蛍光体が、青色を発光する蛍光体であることを特徴とする請求項１記載のプラズマディスプレイパネル。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、ＰＤＰ（プラズマディスプレイパネル）に関し、さらに詳しくは、カラー表示用ＰＤＰの輝度向上のための放電セル構造の改良に関する。

【０００２】

【従来の技術】近年、ＰＤＰはカラー化が進み、テレビ、計算機端末等への応用が可能となり、大型フラットディスプレイ実現可能デバイスとして注目されている。ＰＤＰは、一対のガラス基板を微少間隔で配置し、周辺を封止することによって内部に放電空間を形成した自己発光型の表示パネルである。

【０００３】このようなＰＤＰでは、放電空間は帯状の隔壁によって仕切られている。この隔壁で仕切られた細長い放電空間の中に個別にアドレス可能な放電セルが３種類の電極によって画定されており、カラー表示用のＰＤＰでは、１画素を赤（Ｒ）、緑（Ｇ）、青（Ｂ）の３色の放電セルで構成するようにしている。図７は、一般的なカラー表示用のＡＣ駆動型ＰＤＰの分解斜視図である。

【０００４】この図７において、カラー表示用のＡＣ駆動型ＰＤＰ１０は、前面側ガラス基板１１と背面側ガラス基板２１を主体として構成されている。前面側ガラス基板１１の内面には、主放電を発生させるための一対の放電電極（サスティン電極）Ｘ、Ｙが、平面視において直線状に、かつ互いに平行になるように配置されている。放電電極対Ｘ、Ｙは、それぞれが透明電極１２と金属電極１３とからなり、誘電体層１７で被覆され、さらにその表面は酸化マグネシウム（ＭｇＯ）からなる保護膜１８で覆われている。

【０００５】背面側ガラス基板２１の内面には、下地層

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２２がまず形成され、次にアドレス電極Ａが放電電極対Ｘ、Ｙに直交するように形成された後、絶縁層２４が形成されている。次にアドレス電極Ａを挟むように、全体にわたって均一な幅をもつ帯状の隔壁２９が形成されている。帯状の隔壁２９によって規定される細長い放電空間３０の間隙寸法は表示領域の全域にわたって均一であり、その内面（底面と側面）には、３色（Ｒ、Ｇ、Ｂ）の蛍光体２８Ｒ、２８Ｇ、２８Ｂが規則的に塗布されている。蛍光体２８Ｒ、２８Ｇ、２８Ｂは、放電で生じた紫外線（ＵＶ）により励起されてそれぞれ、赤、緑、青の光を発光する。

【０００６】表示の１ピクセル（画素）は、各放電電極対に対応したラインＬ方向に並ぶ３つの放電セル、すなわちサブピクセル（Ｒ、Ｇ、Ｂ）からなる。

【０００７】

【発明が解決しようとする課題】このような従来のカラー表示用のＰＤＰの技術的課題の１つに輝度の向上がある。ＰＤＰにおいては、微少な放電セルの中の発光面積をできるだけ広くし、輝度が上がるよう蛍光体を隔壁の内面全体に塗布するようにしているのであるが、それでもなお一層の発光輝度の改善が求められている。

【０００８】また、赤、緑、青の各蛍光体の発光効率と最高輝度は、実際には均一でないため、同じ強さの放電で生じた等量の紫外線で励起した場合、特定の色が弱くなり、色バランスが崩れて、表示品質の低下をまねく問題がある。すなわち、従来のカラー表示用のＰＤＰにおいて、色バランスを保ったまま、発光輝度を上げようとした場合、全ての蛍光体について同じ比率で発光輝度を上げることは困難である。

【０００９】例えば、現時点で入手可能な蛍光体においては赤と緑の蛍光体に比べての青の蛍光体の最高輝度が、６０から７０％程度低いため３色合成による白色発光の最適混合比を考慮すると、パネル全体の発光輝度が最も輝度の低い青の蛍光体の発光輝度の上がり具合に左右されてしまうわけである。また、特定の色を発光する蛍光体の発光輝度を上げることにより、白色バランスを変えて、特定の色を強調しようとする場合、その色を発光する蛍光体の発光輝度上昇範囲内でしか色バランスを変えることができない。

【００１０】この発明は、このような事情を考慮してなされたもので、特定の色を発光する蛍光体の発光面積を増やすようなセル構造を採用して発光輝度の改善を図るとともに、白色バランスを保ったり、あるいは、変化させたりすることが可能なＰＤＰを提供するものである。

【００１１】

【課題を解決するための手段】つまり本発明は、各色対応の放電セルごとに発光する蛍光体面積を変えるべく放電セルを画定する隔壁のパターンを、従来の単純なストライプから低輝度蛍光体の放電セルにおいてその周辺長が長くなるパターンに変形させることを主旨とするもの

である。

【００１２】すなわち、請求項１の発明に係わるプラズマディスプレイパネルは、互いに平行に配置された複数の放電電極対と、前記放電電極対に交叉する方向に配置されている複数の隔壁とを有し、隣接する隔壁に挟まれた放電空間に、順次異なる発光色に対応した３種類の蛍光体を配置したプラズマディスプレイパネルであって、前記蛍光体のうち、発光色の輝度が低い蛍光体が配置されている放電空間において、前記放電電極対に対応した放電セル部の隔壁間隔よりも非放電セル部の隔壁間隔が狭くなるように、各隔壁の側縁形状を規則的に左右非対称に形成し、当該低輝度蛍光体の放電セル周辺部における発光面を広くしたことを特徴とするプラズマディスプレイパネルである。

【００１３】請求項２の発明に係わるプラズマディスプレイパネルは、前記発光色の低い蛍光体が、青色を発光する蛍光体である。要するにこの発明は、放電セルの配列ピッチを一定に保持したまま単位発光領域（サブピクセル）を画定する隔壁の側縁形状を変化させることにより、特に青色蛍光体のサブピクセルの発光輝度を実効的に高めるようにしたものである。

【００１４】

【発明の実施の形態】図１は本発明に係わるＰＤＰの要部の分解斜視図、図２は本発明に係わるＰＤＰの隔壁の側縁形状と蛍光体との配置関係を示す平面図、図３は本発明に係わるＰＤＰの隔壁と電極との配置関係を示す平面図、図４は図２におけるＩ－Ｉ’線上の１ピクセル（画素）間の断面図、図５は図２におけるＪ－Ｊ’線上の１ピクセル（画素）間の断面図、図６は図３において１ピクセル（画素）を拡大した平面図である。

【００１５】図１におけるＰＤＰ４０は、全体としては図７の従来のＰＤＰ１０と同様に、前面側ガラス基板４１と背面側ガラス基板５１を主体として構成されている。前面側ガラス基板４１の内面には、主放電を発生させるための一対の放電電極（サスティン電極）Ｘ、Ｙが、平面視において直線状に、かつ互いに平行になるように配置されている。放電電極対Ｘ、Ｙは、それぞれが透明電極４２と金属電極４３とからなり、誘電体層４７で被覆され、さらにその表面は酸化マグネシウム（ＭｇＯ）からなる保護膜４８で覆われている。

【００１６】背面側ガラス基板５１の内面には、下地層５２がまず形成され、次にアドレス電極Ａが放電電極対Ｘ、Ｙに直交するように形成された後、絶縁層５４が形成されている。ここまでの構成は従来のパネル構成と実質的に変わるところはないが、本発明においては次にアドレス電極Ａを挟むように形成する隔壁５９に大きな特徴を備えている。

【００１７】すなわち、隔壁５９は第２図の平面図から一層明らかなように３種類のパターン５９ａ、５９ｂ、５９ｃをもち、この３種類のパターンの隔壁５９が５９ａ、５９ｂ、５９ｃの順に繰り返し配置されている。これにより形成される放電空間６０のうち、平面視において隔壁５９ａの右側側縁と隔壁５９ｂの左側側縁により形成される放電空間６０Ｂには最も輝度の低い青の蛍光体５８Ｂを塗布している。

【００１８】以下同様に、５９ｂの右側側縁と５９ｃの左側側縁からなる放電空間６０Ｒには赤の蛍光体５８Ｇを、５９ｃの右側側縁と５９ａの左側側縁からなる放電空間６０Ｇには緑の蛍光体５８Ｒをそれぞれ塗布している。隔壁５９の形成方法としては、低融点ガラスなどの隔壁材料の一様な層を設け、その上にフォトリソグラフィによって所定の隔壁パターンに対応したレジストマスクを設けた後にサンドブラストでパターンニングする方法が好適である。

【００１９】図３は表示面側の放電電極対Ｘ、Ｙを重ねた要部平面図であり、放電空間６０と放電電極対Ｘ、Ｙ、アドレス電極Ａにより各放電セル（サブピクセル）が画定されることになる。この実施例の場合アドレス電極Ａのピッチは一定であり、したがって、放電セルの配列ピッチも一定である。しかしながら、低輝度蛍光体５８Ｂの放電セル部の隔壁間隔を広げても良い。

【００２０】図６は図３の中から表示の１ピクセル（画素）分を取り出して示した平面図であり、従来のＰＤＰ１０と同様に各放電電極対に対応したライン方向に並ぶ３色の放電セル、すなわちサブピクセル（６０Ｒ、６０Ｇ、６０Ｂ）からなる。図６から明らかなように、放電空間６０の各放電電極対間に対応するセル（６０Ｒ、６０Ｇ、６０Ｂの寸法ＤとＷは各セルにおいて実質的に均等であるが、放電電極対Ｘ、Ｙを外れた非放電部において隔壁間隔が狭くなっている放電空間においては、放電セル部を囲む隔壁の実効長が長くなっていることが判る。

【００２１】すなわち、本実施例のＰＤＰ４０においては、青に対して３．６７倍の輝度を持つ緑の蛍光体を塗布している放電空間の、各放電電極対間（逆スリット）にあたる非放電部分の間隙寸法は、放電セル部の間隙寸法と同じになるよう隔壁５９を形成している。また、青に対して２．２７倍の輝度を持つ赤の蛍光体を塗布している放電空間の、各放電電極対間（逆スリット）にあたる非放電部分の間隙寸法は、放電セル部の間隙寸法より狭くなるよう隔壁５９を形成している。そして、青を発光する蛍光体を塗布している放電空間の、各放電電極対間（逆スリット）にあたる非放電部分の間隙寸法は、緑の場合よりもさらに狭くなるよう隔壁５９を形成している。

【００２２】これにより、放電セル部（スリット部）と各放電電極対間（逆スリット部）にあたる部分の間隙寸法の差が大きい程、その両部分をつなぐ区間を形成している隔壁５９の側縁の傾斜が大きくなり、放電セル部の周辺を隔壁５９が囲むような形状になる。図６に示すよ

うに、隔壁５９の側傾斜が大きく、隔壁５９により囲まれた形状になっているほど、放電セル部周辺での、放電により生じた紫外線（ＵＶ）により励起し発光する蛍光体の面積が増加する。

【００２３】上述の実施形態によれば、各放電電極対間にあたる部分の間隙寸法を変化させることで、放電セル周辺の放電により発光する蛍光体の面積を変化させることができ、放電セル周辺の総合的な蛍光体の発光輝度を実効的に向上させることができる。よって、白色バランスを保ったまま、もともと発光輝度の高い赤の蛍光体や、緑の蛍光体の発光輝度を下げることなく、もともと発光輝度の低い青の蛍光体の発光輝度を向上させることができる。

【００２４】本実施例においては、発光輝度を向上させる上で問題になる青の蛍光体の発光輝度向上のために隔壁５９の形状を変化させたが、特定の白色バランスをつくり出す際にも隔壁５９の形状を変化させることで、特定の色の蛍光体の発光輝度に制限されることがなくなる。なお、本実施例においては、ＰＤＰとしてカラー表示用のＡＣ駆動型ＰＤＰを例に挙げて説明したが、本発明はこれに限定されるものではなく、カラー表示用であれば、あらゆるＰＤＰに適用することができる。

【００２５】

【発明の効果】この発明によれば、発光輝度の高い蛍光体の発光輝度を下げることなく、発光輝度の低い蛍光体の発光輝度を上げることができるので、白色バランスを保ったまま、発光輝度の改善がおこなえる。また、発光輝度を落とすことなく、白色バランスを変化させることができる。

【図面の簡単な説明】

【図１】本発明に係わるＰＤＰの要部の分解斜視図である。

【図２】本発明に係わるＰＤＰの隔壁の側縁形状と蛍光体との配置関係を示す平面図である。

【図３】本発明に係わるＰＤＰの隔壁と電極との配置関係を示す平面図である。

【図４】図２におけるＩ－Ｉ’線上の１ピクセル（画素）間の断面図である。

【図５】図２におけるＪ－Ｊ’線上の１ピクセル（画素）間の断面図である。

【図６】図３において１ピクセル（画素）を拡大した平面図である。

【図７】従来のカラー表示用のＡＣ駆動型ＰＤＰの分解斜視図である。

【符号の説明】

１０、４０・・・ＰＤＰ（プラズマディスプレイパネル）

２８Ｒ、２８Ｇ、２８Ｂ、５８Ｒ、５８Ｇ、５８Ｂ・・・蛍光体

２９、５９ａ、５９ｂ、５９ｃ・・・隔壁

３０、６０Ｒ、６０Ｇ、６０Ｂ・・・放電空間

ＥＧ・・・ピクセル（画素）

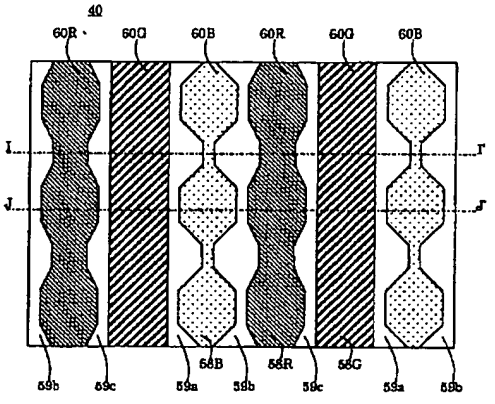
ＥＵ・・・サブピクセル（単位発光領域）

Ｘ、Ｙ・・・放電電極

ＵＶ・・・紫外線

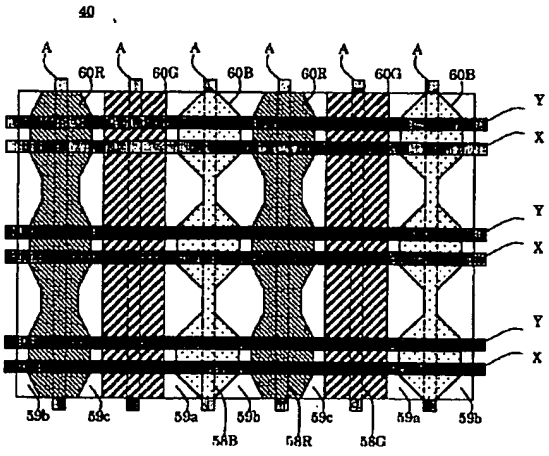
【図２】

本発明に係わるＰＤＰの隔壁の側縁形状と蛍光体との配置関係を示す平面図



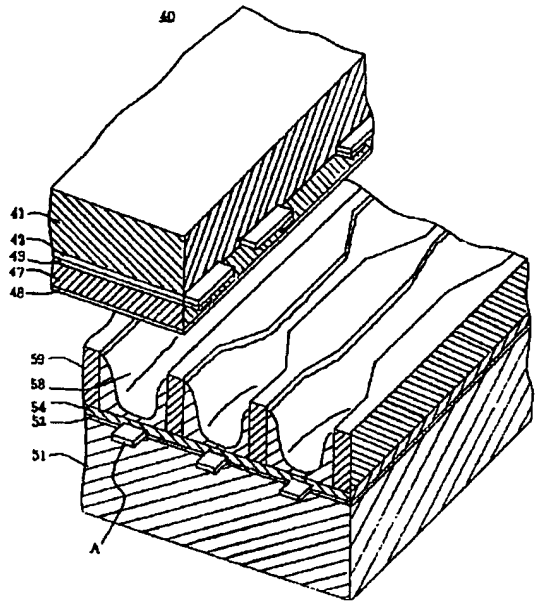
【図３】

本発明に係わるＰＤＰの隔壁と電極との配置関係を示す平面図



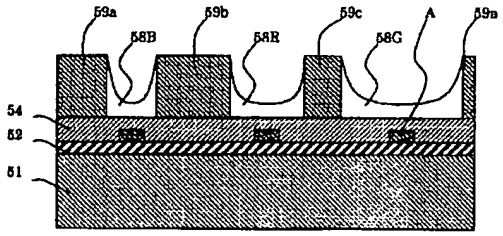
【図1】

本発明に係わるＰＤＰの要部の分解斜視図



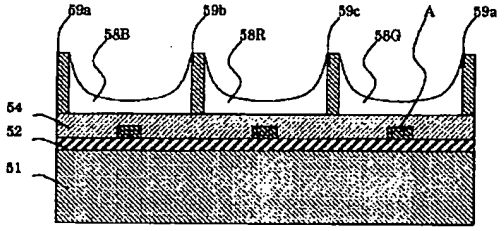
【図4】

図２における１−１' 線上の１ピクセル（画素）間の断面図



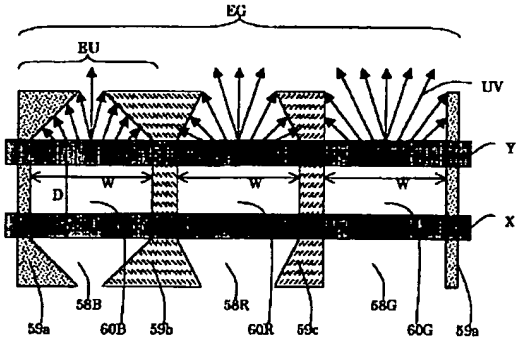
【図5】

図２におけるＪ−Ｊ' 線上の１ピクセル（画素）間の断面図



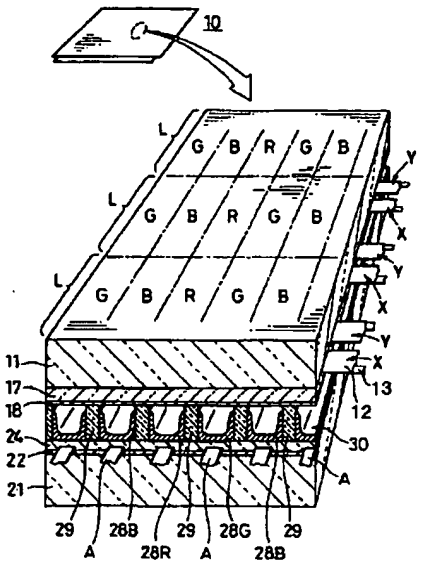
【図6】

図３において１ピクセル（画素）を拡大した平面図



【図7】

従来のカラー表示用のＡＣ駆動型ＰＤＰの分解斜視図



フロントページの続き

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Ｆターム(参考)　5C040 AA01 AA05 BB05 BB08 BB11
DD09 DD13

JAPANESE [JP,2000-011894,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] It has two or more discharge electrode pairs arranged in parallel mutually and two or more septa arranged in the direction which intersects said discharge electrode pair. In the discharge space where it is the plasma display panel which has arranged three kinds of fluorescent substances corresponding to the different luminescent color one by one, and the fluorescent substance with the brightness of the luminescent color low among said fluorescent substances is arranged in the discharge space inserted into the adjoining septum The plasma display panel characterized by having formed the side edge configuration of each septum in right-and-left asymmetry regularly, and making large the luminescence side in the discharge cel periphery of the low brightness fluorescent substance concerned so that septum spacing of the non-discharging cel section may become narrow rather than septum spacing of the discharge cel section corresponding to said discharge electrode pair.
[Claim 2] The plasma display panel according to claim 1 characterized by a fluorescent substance with the low brightness of said luminescent color being a fluorescent substance which emits light in blue.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to amelioration of the discharge cellular structure for the improvement in brightness of PDP for color displays in more detail about PDP (plasma display panel).
[0002]
[Description of the Prior Art] In recent years, colorization progresses, and PDP becomes applicable to television, a computer terminal, etc., and attracts attention as a large-sized flat display realizable device. PDP is the display panel of the self-luminescence mold in which discharge space was formed inside, by arranging the glass substrate of a pair at very small spacing, and closing the circumference.
[0003] Discharge space is divided with such PDP by the band-like septum. The discharge cel in which the address is possible is demarcated with three kinds of electrodes according to the individual in the long and slender discharge space divided with this septum, and he is trying to constitute 1 pixel from red (R), green (G), and a discharge cel of three blue (B) colors at PDP for color displays. Drawing 7 is the decomposition perspective view of common AC drive mold PDP for color displays.
[0004] In this drawing 7 , AC drive mold PDP10 for color displays is constituted considering the front-face side glass substrate 11 and the tooth-back side glass substrate 21 as a subject. the discharge electrodes (Sas Tin electrode) X and Y of the pair for making the inside of the front-face side glass substrate 11 generate a main stroke -- plane view -- setting -- the shape of a straight line -- and it is arranged so that it may become parallel mutually. Each consists of a transparent electrode 12 and a metal electrode 13, the discharge electrode pair X and Y are covered with a dielectric layer 17, and the front face is further covered by the protective coat 18 which consists of a magnesium oxide (MgO).
[0005] After the substrate layer 22 is formed first, and being formed so that the discharge electrode pair X, Y, and the address electrode A may next cross at right angles, the insulating layer 24 is formed in the inside of the tooth-back side glass substrate 21. Next, the band-like septum 29 which has uniform width of face over the whole is formed so that the address electrode A may be inserted. The gap dimension of the long and slender discharge space 30 specified by the band-like septum 29 is uniform over the whole region of a viewing area, and the fluorescent substances 28R, 28G, and 28B of three colors (R, G, B) are regularly applied to the inside (a base and side face). Fluorescent substances 28R, 28G, and 28B are excited by the ultraviolet rays (UV) produced in discharge, and emit light in the light of red, green, and blue, respectively.
[0006] 1 pixel (pixel) of a display consists of three discharge cels located in a line in the direction of Rhine L corresponding to each discharge electrode pair, i.e., subpixel, (R, G, B).
[0007]
[Problem(s) to be Solved by the Invention] One of the technical technical problems of such PDP for the conventional color displays has improvement in brightness. In PDP, luminescence area in a very small discharge cel is made large as much as possible, and although he is trying to apply a fluorescent substance to the whole inside of a septum so that brightness may go up, the improvement of still in addition much more luminescence brightness is called for.

[0008] Moreover, since red, green, and the blue luminous efficiency and the blue highest brightness of each fluorescent substance are not uniform in fact, when it excites by the ultraviolet rays of an amount, such as having been generated in discharge of the same strength, a specific color becomes weak, color balance collapses, and it has loam ****** in deterioration of display quality. That is, in PDP for the conventional color displays, when it is going to raise luminescence brightness, with color balance maintained, it is difficult to raise luminescence brightness by the ratio same about all fluorescent substances.

[0009] for example, since the highest brightness of the fluorescent substance of the blue in comparison with red and a green fluorescent substance is low about 70% from 60 in an available fluorescent substance at present, white luminescence by 3 color composition is the optimal -- if a mixing ratio is taken into consideration, the luminescence brightness of the whole panel will be influenced by the riser condition of the luminescence brightness of the fluorescent substance of blue with the lowest brightness -- it divides and comes out. Moreover, when white balance tends to be changed and it is going to emphasize a specific color by raising the luminescence brightness of the fluorescent substance which emits light in a specific color, it can only change color balance that it is fluorescent substance's which emits light's in the color luminescence brightness rise within the limits.

[0010] This invention was made in consideration of such a situation, and white balance is maintained or it offers PDP with possible making it change while it adopts the cellular structure which increases the luminescence area of the fluorescent substance which emits light in a specific color and aims at an improvement of luminescence brightness.

[0011]

[Means for Solving the Problem] That is, this invention makes it main point to make the pattern of the septum which demarcates a discharge cel transform into the pattern with which the circumference length becomes long in the discharge cel of a low brightness fluorescent substance from the conventional simple stripe so that it may change the fluorescent substance area which emits light for every discharge cel corresponding to a color.

[0012] Namely, the plasma display panel concerning invention of claim 1 It has two or more discharge electrode pairs arranged in parallel mutually and two or more septa arranged in the direction which intersects said discharge electrode pair. In the discharge space where it is the plasma display panel which has arranged three kinds of fluorescent substances corresponding to the different luminescent color one by one, and the fluorescent substance with the brightness of the luminescent color low among said fluorescent substances is arranged in the discharge space inserted into the adjoining septum So that septum spacing of the non-discharging cel section may become narrow rather than septum spacing of the discharge cel section corresponding to said discharge electrode pair It is the plasma display panel characterized by having formed the side edge configuration of each septum in right-and-left asymmetry regularly, and making large the luminescence side in the discharge cel periphery of the low brightness fluorescent substance concerned.

[0013] The plasma display panel concerning invention of claim 2 is a fluorescent substance with which a fluorescent substance with said low luminescent color emits light in blue. changing the side edge configuration of a septum of demarcating a unit luminescence field (subpixel) while this invention had held the array pitch of a discharge cel uniformly, in short -- especially, the luminescence brightness of the subpixel of a blue fluorescent substance is raised effectually.

[0014]

[Embodiment of the Invention] The decomposition perspective view of the important section of PDP concerning this invention in drawing 1 , the top view showing the arrangement relation of the side edge configuration of the septum of PDP and fluorescent substance concerning this invention in drawing 2 , The top view showing the arrangement relation of the septum of PDP and electrode concerning this invention in drawing 3 , The sectional view for 1 pixel (pixel) on an I-I'J-J [in / in the sectional view for 1 pixel on a line (pixel) and drawing 5 / drawing 2]' line [in / in drawing 4 / drawing 2] and drawing 6 are the top views which expanded 1 pixel (pixel) in drawing 3 .

[0015] PDP40 in drawing 1 is constituted like conventional PDP10 of drawing 7 as the whole

considering the front-face side glass substrate 41 and the tooth-back side glass substrate 51 as a subject. the discharge electrodes (Sas Tin electrode) X and Y of the pair for making the inside of the front-face side glass substrate 41 generate a main stroke -- plane view -- setting -- the shape of a straight line -- and it is arranged so that it may become parallel mutually. Each consists of a transparent electrode 42 and a metal electrode 43, the discharge electrode pair X and Y are covered with a dielectric layer 47, and the front face is further covered by the protective coat 48 which consists of a magnesium oxide (MgO).

[0016] After the substrate layer 52 is formed first, and being formed so that the discharge electrode pair X, Y, and the address electrode A may next cross at right angles, the insulating layer 54 is formed in the inside of the tooth-back side glass substrate 51. Although there are not a panel configuration of the former [configuration / so far] and a place which changes substantially, the septum 59 formed so that the address electrode A may be inserted next in this invention is equipped with the big description.

[0017] That is, a septum 59 has three kinds of patterns 59a, 59b, and 59c so that still more clearly from the top view of Fig. 2, and the septum 59 of three kinds of this pattern is repeatedly arranged in order of 59a, 59b, and 59c. Fluorescent substance 58B of blue with the lowest brightness is applied to discharge space 60B formed in plane view among the discharge space 60 formed by this of the right-hand side side edge of septum 59a, and the left-hand side side edge of septum 59b.

[0018] Green fluorescent substance 58R is applied to discharge space 60G which consist fluorescent substance 58G of red of a right-hand side side edge of 59c, and a left-hand side side edge of 59a like the following at discharge space 60R which consists of a right-hand side side edge of 59b, and a left-hand side side edge of 59c, respectively. After preparing the uniform layer of septum ingredients, such as low melting glass, as the formation approach of a septum 59 and preparing the resist mask corresponding to a predetermined septum pattern by the photolithography on it, the approach of carrying out pattern NINGU with sandblasting is suitable.

[0019] Drawing 3 is the important section top view on which the discharge electrode pair X by the side of the screen and Y were put, and each discharge cel (subpixel) will be demarcated with discharge space 60, the discharge electrode pair X, Y, and the address electrode A. In the case of this example, the pitch of the address electrode A is fixed, therefore its array pitch of a discharge cel is also fixed. However, septum spacing of the discharge cel section of low brightness fluorescent substance 58B may be extended.

[0020] Drawing 6 is the top view having taken out and shown a part for 1 pixel (pixel) of a display out of drawing 3 , and consists of a discharge cel of three colors located in a line in the direction of Rhine corresponding to each discharge electrode pair, i.e., subpixel, (60R, 60G, 60B) like conventional PDP10. The cel corresponding to [so that clearly from drawing 6] between each discharge electrode pair of discharge space 60 (although the dimensions D and W of 60R, 60G, and 60B are substantially equal in each cel, in the discharge space where septum spacing is narrow in the non-discharging section which separated from the discharge electrode pair X and Y, it turns out that the effective length of the septum surrounding the discharge cel section is long.)

[0021] That is, in PDP40 of this example, the gap dimension of the non-discharging part which hits between each discharge electrode pair of the discharge space which has applied the green fluorescent substance which has one 3.67 times the brightness of this to blue (reverse slit) forms the septum 59 so that it may become the same as the gap dimension of the discharge cel section. Moreover, the gap dimension of the non-discharging part which hits between each discharge electrode pair of the discharge space which has applied the fluorescent substance of the red who has one 2.27 times the brightness of this to blue (reverse slit) forms the septum 59 so that it may become narrower than the gap dimension of the discharge cel section. And the gap dimension of the non-discharging part which hits between each discharge electrode pair of the discharge space which has applied the fluorescent substance which emits light in blue (reverse slit) forms the septum 59 so that it may become still narrower than the case of being green.

[0022] Thereby, the inclination of the side edge of the septum 59 which forms the section which connects both the part becomes large, and it becomes the configuration in which a septum 59 surrounds the circumference of the discharge cel section, so that the difference of the gap dimension of the part

which hits between the discharge cel section (slit section) and each discharge electrode pair (reverse slit section) is large. As shown in drawing 6 , the lateroversion slant of a septum 59 is large, and the area of the fluorescent substance which excites by the ultraviolet rays (UV) produced by discharge in the discharge cel section circumference, and emits light increases, so that it is the configuration surrounded by the septum 59.

[0023] According to the above-mentioned operation gestalt, by changing the gap dimension of the part which hits between each discharge electrode pair, the area of the fluorescent substance which emits light by discharge of the discharge cel circumference can be changed, and the luminescence brightness of the synthetic fluorescent substance of the discharge cel circumference can be raised effectually. Therefore, the luminescence brightness of the fluorescent substance of blue with luminescence brightness low from the first can be raised, without lowering the luminescence brightness of the fluorescent substance of red with luminescence brightness high from the first, and a green fluorescent substance, with white balance maintained.

[0024] In this example, although the configuration of a septum 59 was changed for the improvement in luminescence brightness of the blue fluorescent substance which becomes a problem when raising luminescence brightness, also in case specific white balance is made, it is changing the configuration of a septum 59, and being restricted to the luminescence brightness of the fluorescent substance of a specific color is lost. In addition, in this example, although AC drive mold PDP for color displays was mentioned as the example and explained as PDP, this invention is not limited to this, and if it is an object for color displays, it is applicable [this invention] to all PDP(s).

[0025]

[Effect of the Invention] According to this invention, luminescence brightness can be improved, maintaining white balance, since the luminescence brightness of a fluorescent substance with low luminescence brightness was raised without lowering the luminescence brightness of a fluorescent substance with high luminescence brightness. Moreover, white balance can be changed, without dropping luminescence brightness.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to amelioration of the discharge cellular structure for the improvement in brightness of PDP for color displays in more detail about PDP (plasma display panel).

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PRIOR ART

[Description of the Prior Art] In recent years, colorization progresses, and PDP becomes applicable to television, a computer terminal, etc., and attracts attention as a large-sized flat display realizable device. PDP is the display panel of the self-luminescence mold in which discharge space was formed inside, by arranging the glass substrate of a pair at very small spacing, and closing the circumference.
[0003] Discharge space is divided with such PDP by the band-like septum. The discharge cel in which the address is possible is demarcated with three kinds of electrodes according to the individual in the long and slender discharge space divided with this septum, and he is trying to constitute 1 pixel from red (R), green (G), and a discharge cel of three blue (B) colors at PDP for color displays. Drawing 7 is the decomposition perspective view of common AC drive mold PDP for color displays.
[0004] In this drawing 7 , AC drive mold PDP10 for color displays is constituted considering the front-face side glass substrate 11 and the tooth-back side glass substrate 21 as a subject. the discharge electrodes (Sas Tin electrode) X and Y of the pair for making the inside of the front-face side glass substrate 11 generate a main stroke -- plane view -- setting -- the shape of a straight line -- and it is arranged so that it may become parallel mutually. Each consists of a transparent electrode 12 and a metal electrode 13, the discharge electrode pair X and Y are covered with a dielectric layer 17, and the front face is further covered by the protective coat 18 which consists of a magnesium oxide (MgO).
[0005] After the substrate layer 22 is formed first, and being formed so that the discharge electrode pair X, Y, and the address electrode A may next cross at right angles, the insulating layer 24 is formed in the inside of the tooth-back side glass substrate 21. Next, the band-like septum 29 which has uniform width of face over the whole is formed so that the address electrode A may be inserted. The gap dimension of the long and slender discharge space 30 specified by the band-like septum 29 is uniform over the whole region of a viewing area, and the fluorescent substances 28R, 28G, and 28B of three colors (R, G, B) are regularly applied to the inside (a base and side face). Fluorescent substances 28R, 28G, and 28B are excited by the ultraviolet rays (UV) produced in discharge, and emit light in the light of red, green, and blue, respectively.
[0006] 1 pixel (pixel) of a display consists of three discharge cels located in a line in the direction of Rhine L corresponding to each discharge electrode pair, i.e., subpixel, (R, G, B).

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, luminescence brightness can be improved, maintaining white balance, since the luminescence brightness of a fluorescent substance with low luminescence brightness was raised without lowering the luminescence brightness of a fluorescent substance with high luminescence brightness. Moreover, white balance can be changed, without dropping luminescence brightness.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] One of the technical technical problems of such PDP for the conventional color displays has improvement in brightness. In PDP, luminescence area in a very small discharge cel is made large as much as possible, and although he is trying to apply a fluorescent substance to the whole inside of a septum so that brightness may go up, the improvement of still in addition much more luminescence brightness is called for.
[0008] Moreover, since red, green, and the blue luminous efficiency and the blue highest brightness of each fluorescent substance are not uniform in fact, when it excites by the ultraviolet rays of an amount, such as having been generated in discharge of the same strength, a specific color becomes weak, color balance collapses, and it has loam ****** in deterioration of display quality. That is, in PDP for the conventional color displays, when it is going to raise luminescence brightness, with color balance maintained, it is difficult to raise luminescence brightness by the ratio same about all fluorescent substances.
[0009] for example, since the highest brightness of the fluorescent substance of the blue in comparison with red and a green fluorescent substance is low about 70% from 60 in an available fluorescent substance at present, white luminescence by 3 color composition is the optimal -- if a mixing ratio is taken into consideration, the luminescence brightness of the whole panel will be influenced by the riser condition of the luminescence brightness of the fluorescent substance of blue with the lowest brightness -- it divides and comes out. Moreover, when white balance tends to be changed and it is going to emphasize a specific color by raising the luminescence brightness of the fluorescent substance which emits light in a specific color, it can only change color balance that it is fluorescent substance's which emits light's in the color luminescence brightness rise within the limits.
[0010] This invention was made in consideration of such a situation, and white balance is maintained or it offers PDP with possible making it change while it adopts the cellular structure which increases the luminescence area of the fluorescent substance which emits light in a specific color and aims at an improvement of luminescence brightness.

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MEANS

[Means for Solving the Problem] That is, this invention makes it main point to make the pattern of the septum which demarcates a discharge cel transform into the pattern with which the circumference length becomes long in the discharge cel of a low brightness fluorescent substance from the conventional simple stripe so that it may change the fluorescent substance area which emits light for every discharge cel corresponding to a color.
[0012] Namely, the plasma display panel concerning invention of claim 1 It has two or more discharge electrode pairs arranged in parallel mutually and two or more septa arranged in the direction which intersects said discharge electrode pair. In the discharge space where it is the plasma display panel which has arranged three kinds of fluorescent substances corresponding to the different luminescent color one by one, and the fluorescent substance with the brightness of the luminescent color low among said fluorescent substances is arranged in the discharge space inserted into the adjoining septum So that septum spacing of the non-discharging cel section may become narrow rather than septum spacing of the discharge cel section corresponding to said discharge electrode pair It is the plasma display panel characterized by having formed the side edge configuration of each septum in right-and-left asymmetry regularly, and making large the luminescence side in the discharge cel periphery of the low brightness fluorescent substance concerned.
[0013] The plasma display panel concerning invention of claim 2 is a fluorescent substance with which a fluorescent substance with said low luminescent color emits light in blue. changing the side edge configuration of a septum of demarcating a unit luminescence field (subpixel) while this invention had held the array pitch of a discharge cel uniformly, in short -- especially, the luminescence brightness of the subpixel of a blue fluorescent substance is raised effectually.
[0014]
[Embodiment of the Invention] The decomposition perspective view of the important section of PDP concerning this invention in drawing 1 , the top view showing the arrangement relation of the side edge configuration of the septum of PDP and fluorescent substance concerning this invention in drawing 2 , The top view showing the arrangement relation of the septum of PDP and electrode concerning this invention in drawing 3 , The sectional view for 1 pixel (pixel) on an I-I'J-J [in / in the sectional view for 1 pixel on a line (pixel) and drawing 5 / drawing 2]' line [in / in drawing 4 / drawing 2] and drawing 6 are the top views which expanded 1 pixel (pixel) in drawing 3 .
[0015] PDP40 in drawing 1 is constituted like conventional PDP10 of drawing 7 as the whole considering the front-face side glass substrate 41 and the tooth-back side glass substrate 51 as a subject. the discharge electrodes (Sas Tin electrode) X and Y of the pair for making the inside of the front-face side glass substrate 41 generate a main stroke -- plane view -- setting -- the shape of a straight line -- and it is arranged so that it may become parallel mutually. Each consists of a transparent electrode 42 and a metal electrode 43, the discharge electrode pair X and Y are covered with a dielectric layer 47, and the front face is further covered by the protective coat 48 which consists of a magnesium oxide (MgO).
[0016] After the substrate layer 52 is formed first, and being formed so that the discharge electrode pair X, Y, and the address electrode A may next cross at right angles, the insulating layer 54 is formed in the

inside of the tooth-back side glass substrate 51. Although there are not a panel configuration of the former [configuration / so far] and a place which changes substantially, the septum 59 formed so that the address electrode A may be inserted next in this invention is equipped with the big description.
[0017] That is, a septum 59 has three kinds of patterns 59a, 59b, and 59c so that still more clearly from the top view of Fig. 2, and the septum 59 of three kinds of this pattern is repeatedly arranged in order of 59a, 59b, and 59c. Fluorescent substance 58B of blue with the lowest brightness is applied to discharge space 60B formed in plane view among the discharge space 60 formed by this of the right-hand side side edge of septum 59a, and the left-hand side side edge of septum 59b.
[0018] Green fluorescent substance 58R is applied to discharge space 60G which consist fluorescent substance 58G of red of a right-hand side side edge of 59c, and a left-hand side side edge of 59a like the following at discharge space 60R which consists of a right-hand side side edge of 59b, and a left-hand side side edge of 59c, respectively. After preparing the uniform layer of septum ingredients, such as low melting glass, as the formation approach of a septum 59 and preparing the resist mask corresponding to a predetermined septum pattern by the photolithography on it, the approach of carrying out pattern NINGU with sandblasting is suitable.
[0019] Drawing 3 is the important section top view on which the discharge electrode pair X by the side of the screen and Y were put, and each discharge cel (subpixel) will be demarcated with discharge space 60, the discharge electrode pair X, Y, and the address electrode A. In the case of this example, the pitch of the address electrode A is fixed, therefore its array pitch of a discharge cel is also fixed. However, septum spacing of the discharge cel section of low brightness fluorescent substance 58B may be extended.
[0020] Drawing 6 is the top view having taken out and shown a part for 1 pixel (pixel) of a display out of drawing 3 , and consists of a discharge cel of three colors located in a line in the direction of Rhine corresponding to each discharge electrode pair, i.e., subpixel, (60R, 60G, 60B) like conventional PDP10. The cel corresponding to [so that clearly from drawing 6] between each discharge electrode pair of discharge space 60 (although the dimensions D and W of 60R, 60G, and 60B are substantially equal in each cel, in the discharge space where septum spacing is narrow in the non-discharging section which separated from the discharge electrode pair X and Y, it turns out that the effective length of the septum surrounding the discharge cel section is long.)
[0021] That is, in PDP40 of this example, the gap dimension of the non-discharging part which hits between each discharge electrode pair of the discharge space which has applied the green fluorescent substance which has one 3.67 times the brightness of this to blue (reverse slit) forms the septum 59 so that it may become the same as the gap dimension of the discharge cel section. Moreover, the gap dimension of the non-discharging part which hits between each discharge electrode pair of the discharge space which has applied the fluorescent substance of the red who has one 2.27 times the brightness of this to blue (reverse slit) forms the septum 59 so that it may become narrower than the gap dimension of the discharge cel section. And the gap dimension of the non-discharging part which hits between each discharge electrode pair of the discharge space which has applied the fluorescent substance which emits light in blue (reverse slit) forms the septum 59 so that it may become still narrower than the case of being green.
[0022] Thereby, the inclination of the side edge of the septum 59 which forms the section which connects both the part becomes large, and it becomes the configuration in which a septum 59 surrounds the circumference of the discharge cel section, so that the difference of the gap dimension of the part which hits between the discharge cel section (slit section) and each discharge electrode pair (reverse slit section) is large. As shown in drawing 6 , the lateroversion slant of a septum 59 is large, and the area of the fluorescent substance which excites by the ultraviolet rays (UV) produced by discharge in the discharge cel section circumference, and emits light increases, so that it is the configuration surrounded by the septum 59.
[0023] According to the above-mentioned operation gestalt, by changing the gap dimension of the part which hits between each discharge electrode pair, the area of the fluorescent substance which emits light by discharge of the discharge cel circumference can be changed, and the luminescence brightness of the

synthetic fluorescent substance of the discharge cel circumference can be raised effectually. Therefore, the luminescence brightness of the fluorescent substance of blue with luminescence brightness low from the first can be raised, without lowering the luminescence brightness of the fluorescent substance of red with luminescence brightness high from the first, and a green fluorescent substance, with white balance maintained.

[0024] In this example, although the configuration of a septum 59 was changed for the improvement in luminescence brightness of the blue fluorescent substance which becomes a problem when raising luminescence brightness, also in case specific white balance is made, it is changing the configuration of a septum 59, and being restricted to the luminescence brightness of the fluorescent substance of a specific color is lost. In addition, in this example, although AC drive mold PDP for color displays was mentioned as the example and explained as PDP, this invention is not limited to this, and if it is an object for color displays, it is applicable [this invention] to all PDP(s).

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the decomposition perspective view of the important section of PDP concerning this invention.
[Drawing 2] It is the top view showing the arrangement relation of the side edge configuration of the septum of PDP and fluorescent substance concerning this invention.
[Drawing 3] It is the top view showing the arrangement relation of the septum of PDP and electrode concerning this invention.
[Drawing 4] It is a sectional view for 1 pixel on the I-I' line in drawing 2 (pixel).
[Drawing 5] It is a sectional view for 1 pixel on the J-J' line in drawing 2 (pixel).
[Drawing 6] It is the top view which expanded 1 pixel (pixel) in drawing 3 .
[Drawing 7] It is the decomposition perspective view of AC drive mold PDP for the conventional color displays.
[Description of Notations]
10 40 ... PDP (plasma display panel)
28R, 28G, 28B, 58R, 58G, 58B ... Fluorescent substance
29, 59a, 59b, 59c ... Septum
30, 60R, 60G, 60B ... Discharge space
EG ... Pixel (pixel)
EU ... Subpixel (unit luminescence field)
X, Y ... Discharge electrode
UV ... Ultraviolet rays

[Translation done.]

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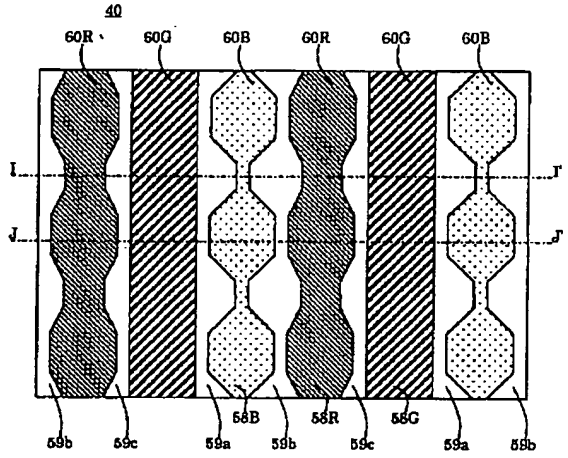
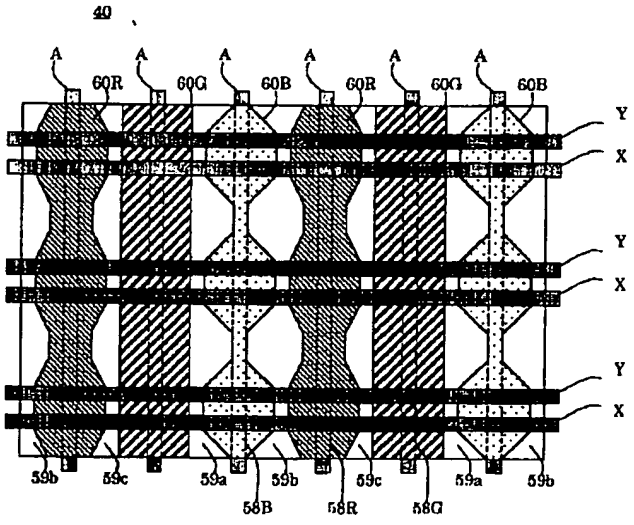
DRAWINGS

[Drawing 2]
本発明に係わるＰＤＰの隔壁の側線形状と蛍光体との配置関係を示す平面図

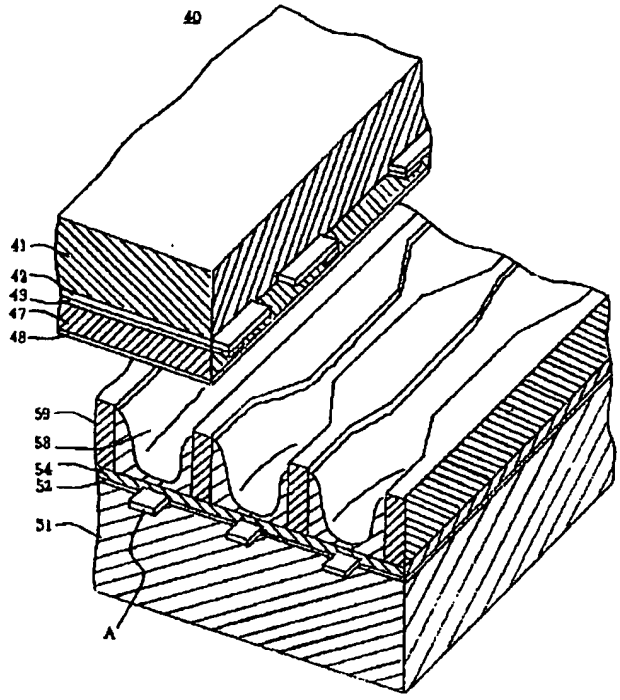


[Drawing 3]
本発明に係わるＰＤＰの隔壁と電極との配置関係を示す平面図



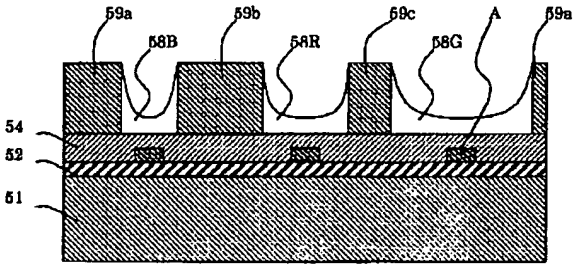
[Drawing 1]

本発明に係わるＰＤＰの要部の分解斜視図



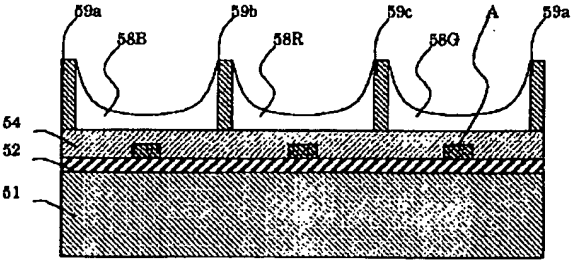
[Drawing 4]

図２における１－１' 線上の１ピクセル（画素）間の断面図



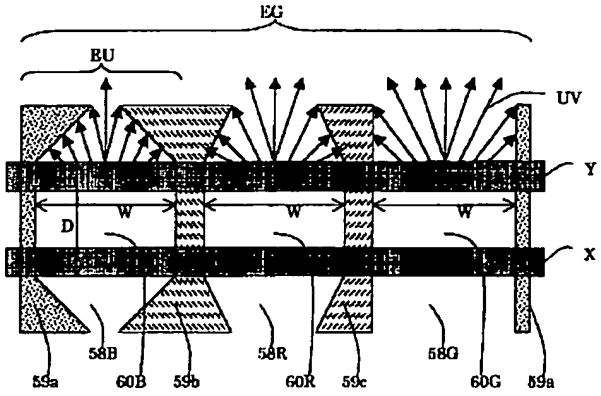
[Drawing 5]

図２における１－１' 線上の１ピクセル（画素）間の断面図



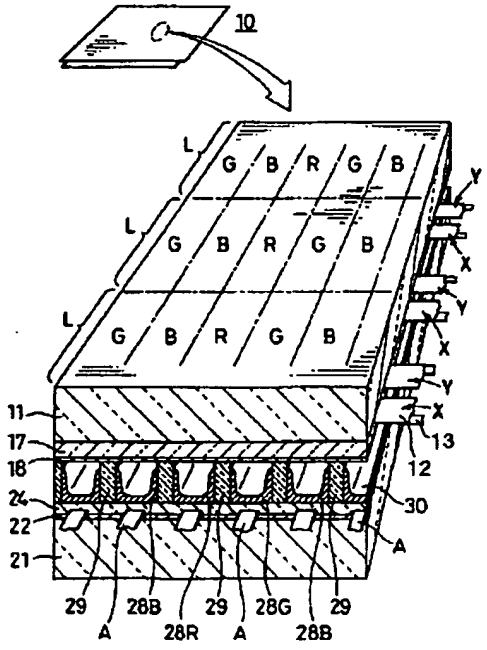
[Drawing 6]

図３において１ピクセル（画素）を拡大した平面図



[Drawing 7]

従来のカラー表示用のＡＣ駆動型ＰＤＰの分解斜視図



[Translation done.]

1. JP,2000-011894,A